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## (54) LIQUID CRYSTAL DISPLAY ELEMENT

## (57) Abstract:

**PURPOSE:** To utilize the electric power obtd. in solar batteries for a part of power source power and to save the electric power of an electronic apparatus by providing the inside substrate of one of substrates facing each other across liquid crystals with a solar batteries in correspondence to the spacings between respective pixels.

**CONSTITUTION:** The inside surface of the front surface side substrate 2 is provided with the solar batteries 15 for obtaining the electric power by utilizing the incident light on liquid crystal display elements in correspondence to the spacings between color filters 14R, 14G, 14B of respective colors. The parts corresponding to the respective pixels are formed as grid-shaped patterns over the entire part of the display regions of the liquid crystal display elements. The solar batteries 15 consist of upper electrodes 16 formed on the substrate 2 surface, p type and n type semiconductor films 17p, 17n laminated on the upper electrodes 16 and lower electrodes 18 formed thereunder. The electric power generated by the solar batteries 15 are taken out of the terminal parts of the upper and lower electrodes 16, 17. Then, the large electric power is obtd. by efficiently and effectively utilizing the light not used for display without generating the

degradation in the brightness of the display and the opening rate.

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